Claim Amendments—Discussion

Application Number 10/605,157
Inventor: Howard Gutowitz
Examiner: Tanh Q. Nguyen
Art Unit: 2182

The Examiner's point 1 notes that that the request for continued examination of application number 10/605,157 has been entered.

The Examiner's point 2, notes that the present office action rejects claim 1 which had previously been allowed. This claim has been amended, as discussed in detail below.

The Examiner's points 3 and 4 note that claims 2, 4-6, 12-13 and 20 have not been examined in the present action, pending allowance of claim 1. Claim 1 has been amended, as discussed in detail below, and it is believed that this claim is now allowable, and I therefore respectfully request examination of claims 2, 4-6, 12-13 and 20 as amended, where amended.

The Examiner's point 5 points out a number of informalities in the claims. It is believe that all of these have been corrected in the amended claims attached.

The Examiner's point 6 recites UCS 102.

The Examiner's point 7 and 8 refer to claims 1, 7-11, 14, 16, 18-19. The claims have been amended to include the distinction between printable and non-printable symbols. This distinction helps clarify the differences between the present invention and that of Ouyang, and shows that the claims are allowable over Ouyang.

The distinction between printable and non-printable symbols finds support in paragraphs [0005]-[0026]. In particular, paragraph [0005] defines printable and non-printable symbols, and further paragraphs illuminate the relationship between this concept and other terms used in the disclosure and claims, notably display [0006], keys and keystrokes [0007], input [0009-0010], symbol-input-end symbols [0010], pre- post-

and non-conversion symbols [0011]-[0013], trigger sequences [0014-0021],ambiguous keyboards [0025], and predictive text systems [0026].

The Examiner contends that Ouyang provides "4) a plurality of symbol-input-end symbols [for triggering conversion]", It is here respectfully noted that in the present invention the purpose of non-printable symbol-input-end symbols is *not* for triggering conversion, but rather for causing input of a printable symbol which has been previously merely displayed. This distinction is important for the present invention, and I agree with the Examiner that Ouyang does not seem to make this distinction. In Ouyang certain keystrokes simultaneously input displayed pre-conversion symbol (sequences) and converts them to post-conversion symbols. Inputting and converting are inextricably linked for Ouyang, causing many problems which are avoided by the present invention.

The Examiner further contends that Ouyang provides "7) a second mechanism to recognize trigger sequences [...] said post-conversion symbols [946641 triggering conversion of pre-conversion symbol zhong to a post-conversion symbol in CONVERTED REGION, FIG 7]" We note that "zhong" is not a pre-conversion symbol, but rather a sequence of pre-conversion symbols. The Examiner continues, "said trigger sequences comprising a subsequence of said keystrokes, said subsequence comprising at least two of said keystrokes [94664 and 1 in the sequence 946641]" It is not clear whether Ouyang can be mapped onto the present invention since 94664 is not a keystroke, but a sequence of five keystrokes. We may respectfully ask which of these five keystrokes, if any, is one of the "at least two of said keystrokes"? The Examiner continues further, "such that the first of said keystrokes in said subsequence causes said first mechanism to display *one* of said pre-conversion symbols [94664 of the sequence 946641 causes display of pre-conversion symbols xiong and zhong]" (emphasis added). In this case, Ouyang's *sequence* of keystrokes 94664 causes display of more than one sequence of pre-conversion symbols: xiong and zhong.

As for the second of said keystrokes in said subsequence, there is no sequence/symbol confusion as the second keystroke is the single symbol "1", however "...where said

generated symbol-input-end symbols applies to said displayed pre-conversion symbol [1 in the sequence 94464 1 triggering the conversion of pre-conversion symbol zhong to a corresponding post-conversion symbol in the CONVERTED REGION FIG. 7 hence inherently generating a symbol-input-end symbol]", Therefore, even with regard to the second symbol, we are unable to determine which pre-conversion symbol or symbols the symbol-input-end symbol is to apply to, and cannot therefore relate Ouyang's method to that of the present invention.

With respect to the amended claim, this confusion between sequences and individual symbols cannot occur, since each of the symbols in the sequence are characterized, in particular, for trigger sequences of the continuation class, each keystroke in the sequence continues, in the sense of displaying a further printable symbol (either pre-conversion or non-conversion). There is no corresponding concept or mechanism in Ouyang, nor any suggestion that such could be possible. For Oyang, a keystroke which does not display a pre-conversion symbol or non-conversion symbol is always required to cause conversion if there is any ambiguous representation of keystroke sequences in terms of pinyin. In terms of the present disclosure, the keystroke sequence 94664 serves to *display* the *sequences* of pre-conversion symbols xiong and zhong, but does not serve to *input* either of these pre-conversion sequences or any of the individual pre-conversion symbols in the sequence. Indeed, Ouyang describes these pre-conversion sequences as being in the "incomplete" region. They are incomplete since they have not been converted, but also because they have not been input. The next keystroke, 1, serves to do all of a) select a pre-conversion "symbol" for input (from the two possibilities , xiong and zhong), b) input the selected sequence ("symbol"), and c) convert the selected sequence ("symbol").

By contrast with Ouyang, in the present invention the acts of displaying, selecting, inputting ,and converting are separable. This separation avoids a number of problems with Ouyang, and notably permits the elimination of several keystrokes in the entry of the sequence of Ouyang's figure 7. Under Ouyang, xiong is entered as 946640, and zhong is entered as 946641, in each case, 6 keystrokes are required, 5 to specify the letters, and one for the select/input/convert operation. The keystrokes on 0 and 1 for xiong and zhong

respectively, perform select/input/convert operations on the entire sequence of pre-conversion symbols, but neither 0 nor 1 serve to display an additional pre-conversion or non-conversion symbol.

Let us consider the same operation under the present invention, considered in its "word-based" embodiment. Regardless of how probabilities are measured, one of xiong or zhong is more probable than the other. Assume that xiong is the most probable. To enter xiong using the present invention, no convert key press is required at all to enter xiong. One simply continues typing, with potentially every keystroke generating another pre-conversion or non-conversion symbol. Once xiong is displayed, any subsequent keystroke on a letter key will cause conversion, since the trigger sequence compring 94664-, where "-" represents a next keystroke on a letter key, is sufficient to cause conversion. In the case of zhong, a press of a "Next Word" key would be required to change the display of xiong to the display of zhong. Once zhong is displayed, another keystroke on a letter key will convert zhong to Hanzi. That is, the sequence 94664- will also trigger the conversion of zhong, once zhong has been displayed. Thus, for the example presented in Ouyang's Fig. 7, the present invention is superior to Ouyang. Ouyang always requires 1 extra keystroke, regardless of whether xiong or zhong is intended by the user, while the present invention requires no more than $P(zhong)$ extra keystrokes (where $P()$ means "probability of"). This estimate is for the case in which the predictive mechanism is word-based. Character-based prediction would also give a result which is favorable compared to Ouyang. The expected number of keystrokes would be a function of predictive database size, among other factors. Indeed, Ouyang's fixed association of 0 to xiong and 1 to zhong does a great disservice to the user, since it does not allow for a predictive mechanism to chose which of xiong or zhong should be preferentially displayed depending on context. If the present invention is used rather than Ouyang, and the predictive mechanism is good, it may be possible to reduce the number of extra keystrokes well below $P(zhong)$. An extra "Next Word" keystroke will only be required when the predictive mechanism makes a bad guess.

Ouyang can only avoid extra keystrokes when there is a unique interpretation of a keystroke sequence as a sequence of pinyin letters, and the sequence does not form the initial segment of another pinyin sequence. This case is rare.

It is to be noted that even in the case where there is only one possible interpretation of a sequence of keystrokes as a pinyin, Ouyang does not perform conversion on the basis of keystroke sequence in the continuation class as claimed in amended claim 1. As soon as the system recognizes that a single interpretation is possible, the pinyin is both input and converted. In a trigger sequence of the continuation class, a last keystroke displaying a pre- or non-conversion symbol would be required to trigger conversion, but the displayed symbol would not be part of the post-conversion symbol generated, but rather of the next post-conversion symbol (or no post-conversion symbol), thus continuing text input and producing a conversion as a by-product.

Ouyang's Fig. 7 continues in the same way, with "hun" requiring an additional select/input/convert keystroke (0), and "sen" requiring an additional select/input/convert keystroke (1). Note carefully that none of these three extra keystrokes of Ouyang's Fig. 7 serve to display additional pre-conversion symbols. They serve only to operate on symbols which have been previously displayed.

Further note then when tone marks are not systematically entered by the user, an adequate set of trigger sequences have more elements than the embodiment for Chinese discussed in the disclosure. For instance, the sequence 94464- might be included. However, the inclusion of additional sequences is well within the scope of the disclosure.

One advantage of the present invention is that unlike Ouyang, it does not require a dictionary of Chinese words to avoid presses of a convert key. The use of a dictionary to resolve ambiguities in the conversion of pinyin to hanzi causes a multitude of difficulties, all of which are resolved by the present invention). Dictionaries require a great deal of memory to store, and a great deal of processing power to search .b) Entry of Hanzi sequences which are not in the dictionary is difficult. c) A given pinyin sequence may

correspond to several dictionary words, and these words have to be selected from the set of possibilities by the user in some way. The difficulty of this selection is compounded by the fact that many Chinese words are subsequences of other Chinese words. This is the same problem that Ouyang already encounters at the level of pinyin which are subsequences of other pinyin, but the problem is amplified by the large number of possible Hanzi symbols. The present invention deals with these problems by eliminating the need for a dictionary, and allowing Hanzi prediction and selection to proceed on a Hanzi-by-Hanzi basis. No dictionary can contain all of the Hanzi sequences a user may wish to enter, and any dictionary contains ambiguities which must be resolved by the user. Ouyang leaves these critical problems unaddressed, while the present invention solves them.

Ouyang attempts to reduce keystrokes by linking the operations of selecting/converting/inputting in a single keystroke. A follower of those teachings would have no opportunity to use a predictive mechanism for post-conversion symbols. Consider again the case of distinguishing xiong from zhong, Ouyang adds a keystroke on 0 and 1 for xiong and zhong respectively. By making a fixed relationship between xiong and 0 and zhong and 1, Ouyang prevents any predictive mechanism to present zhong before xiong even if zhong is more likely given the context. Even more seriously, the use of a single key to both select and input means that only a small number of things can be selected from. In the case of post-conversion symbol selection, there may be very many possibilities, many more than the number of keys on a telephone keypad. In the case of Chinese, for instance, there may be 80 or more Hanzi corresponding to a given pinyin. Associating each one of them with a key on the telephone keypad is impossible, though this is what the teachings of Ouyang suggest. The present invention, by contrast, uses either a multi-tap method or a Next key to advance symbols in an other. This allows predictive mechanisms to operate at both the pre-conversion and post-conversion level, a problem neither anticipated nor solved by Ouyang, and impossible to implement in the context of Ouyang. Thus, in reference to the Examiner's point 8), we respectfully suggest that Claim 1, as amended, is allowable over Ouyang, and notice to that effect is requested.

In reference to the Examiner's point 9), regarding claims 7-11, 14, 18-19: The Examiner states that "Oyang teaches a third mechanism to convert said pre-conversion symbols to said post-conversion symbols [600, Fig1], the third mechanism is physically remote from said first mechanism [600, is physically remote from 200, 400, Fig 1]." While Ouyang makes no mention of how far part 600 is from parts 200,400, he refers to these elements as "portions" in Fig. 1, indicating that they are to be considered part and portion of the same machine. The present disclosure, by contrast, makes reference to client-server architectures, [e.g. para. 144, Fig. 26], where it is well understood that the client and server are typically different machines, and thus physically remote. Thus I respectfully traverse the Examiner's suggestion that Ouyang anticipates claim 8. This claim, as well as claim 7 on which it depends, is allowable since it depends from claim 1, which is allowable, as well as for pointing out additional features and advantages of the invention. Notice to this effect is respectfully requested.

Claims 9 and 10 have been amended to clarify that prediction may be based in part on the context of other input symbols. These claims are allowable since they depend from claim 1 which is allowable, and serve as well to point out additional features and advantages of the invention. Notice to this effect is respectfully requested

Claims 11, 12, and 14 concern the use of Next keys in the context of the present invention. The Examiner proposes that in Ouyang, keystroke 1 in the sequence 946641 advances the display of symbols. This rejection is respectfully traversed, since, as discussed above, 1 serves to input and select, but does not "advance". To make the distinction between Ouyang and the present invention clearer, claims 11 and 12 have been amended to point out that a "Next" key increments in a list. Claims 11 and 12, it is respectfully submitted, are now in condition for allowance, and notice to that effect is respectfully requested.

Examiner's point 10 concerns claim 16, a method claim corresponding to the apparatus claim 1. This claim has been amended to track the amendments to claim 1, and for the

same reasons as cited above in reference to claim 1, it is respectfully submitted that this claim is now in condition for allowance, and notice to that effect is respectfully requested.

Examiner's point 11 concerns claims 3, 15, and 17. The Examiner objects to these claims as they are dependent upon claim 1, which had previously been rejected, but is now in condition for allowance. For this reason, I respectfully suggest that these claims should now be considered allowable, and notice to that effect is respectfully requested.

Examiner's point 12 notes that new grounds of rejection render previous arguments moot, the applicant interprets this point to mean that previous arguments may be reintroduced as relevant now that the present rejections have been overcome.